## REMARKS

Claims 1, 2, 4-6, 9-12, 14-17, 19, 20 and 26 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,191,410 to Johnson ("Johnson") in view of U.S. Patent No. 5,446,290 to Fujieda et al. ("Fujieda").

Johnson was cited as disclosing all elements of the invention as claimed except for a flat light guiding plate having parallel opposed main faces. Fujieda was cited as disclosing the use of a flat light guiding plate 13 having parallel opposed main faces in a fingerprint reading device (citing col. 4, lines 39-43).

Claims 3, 7, 8 and 21-25 were rejected under 35 U.S.C. §103(a) as being unpatentable over Johnson in view of Fujieda, and further in view of U.S. Patent No. 5,869,701 to Young ("Young"). Young was cited as disclosing the use of a matrix type LCD display having transparent electrodes driven by thin film transistors in a fingerprint reading device.

By the present amendment, independent claims 1, 6 and 11 have been amended to clarify that the light guiding plate deflects toward a side end light that enters the light guiding plate from a front surface thereof and is directed toward the rear surface. The subject matter of dependent claim 13 has been incorporated into independent claim 11 and claim 13 has accordingly been canceled. The dependency of

claims 14, 15 and 17-19 has been changed in view of the cancellation of claim 13.

Applicants respectfully submit that claims 1-12 and 14-26 patentably distinguish over the prior art of record.

As recited by amended independent device claims 1 and 11, the inventive fingerprint reading device comprises a liquid crystal cell, an illumination source for projecting a light from the rear surface to the front surface of the liquid crystal cell, a flat light guiding plate having parallel opposed main faces disposed on the front surface of the liquid crystal cell for transmitting the light projected from the rear surface of the liquid crystal cell and deflecting light entering from the front surface and directed toward the rear surface toward a side end surface of the light guiding plate, light receiving means on the side end surface of the light guiding plate for receiving the deflected light exiting from the side end surface of the light guiding plate, and a drive circuit for driving the liquid crystal cell to pinpoint-irradiate a fingerprint in contact with the light guiding plate by pinpointing with the light emitted from the illumination source and causing the light receiving means to pinpoint-receive the light reflected by the fingerprint to thereby obtain an image of the fingerprint. Amended independent method claim 11 includes similar language.

Accordingly, each of amended independent claims 1, 6 and 11 requires a flat light guiding plate having parallel opposed main surfaces disposed on a front surface of a liquid crystal cell. The light guiding plate performs two functions: (1) transmitting light projected from the rear surface of the liquid crystal cell; and (2) deflecting toward a side end surface of the light guiding plate light entering from the front surface of the light guiding plate and directed toward the rear surface so that such light may be received by light receiving means provided on the side end surface of the light guiding plate.

In the embodiment illustrated in Figs. 1(a) and 1(b) of the application drawings, the fingerprint reading device 10 has a light guiding plate 12 comprised of a flat plate having parallel opposed main surfaces disposed above the front or viewing surface of an active matrix liquid crystal cell 11. A light receiving device 13 is mounted flush with an end surface of the light guiding plate 12, and an illumination source 14 is disposed on or below the rear surface of the liquid crystal cell 11.

The light guiding plate 12 transmits light emitted from the illumination device 14 toward the front surface side but does not transmit the light coming from the front surface side toward the rear surface side. Instead, the light guiding

plate 12 deflects or guides this light in a plane-direction toward the light receiving device 13 at one side end surface. The light receiving device 13 is constructed of a lens array 15 and a light receiving element 16 such as a photodiode.

The inventive fingerprint reading device can detect a fingerprint comparatively easily by use of an active matrix liquid crystal cell 11 and the light guiding plate 12. Further, the fingerprint reading device 10 has a structure similar to that of a liquid crystal display device and can be relatively simply manufactured at a low cost. The fingerprint reading device 10 can also be easily incorporated together with a liquid crystal panel into an electronic apparatus.

In accordance with the present invention, an image of a fingerprint can be read by use of an active matrix liquid crystal cell and a light guiding plate and the device may be easily incorporated into a liquid crystal display device.

The prior art of record fails to disclose or suggest the use of a flat light guiding plate.

Johnson discloses a fingerprint reading device having a light guiding member disposed on a liquid crystal matrix. As acknowledged by the Examiner, the light guiding member is a wedge-shaped prism and is not a flat light guiding plate having parallel opposing surfaces as recited by amended independent claims 1, 6 and 11.

The various drawbacks associated with the use of a prism in a fingerprint reading device as disclosed by Johnson include the increased thickness of the device caused by the prism, the increased cost of the device, and uneven resolution caused by the prism.

More specifically, a fingerprint read by the Johnson device will be partly out of focus and thus unreadable. Since light spreads as it travels, uneven distances are traveled by light in the prism. Thus results in distortion in reading the fingerprint because the distance traveled by light differs in different portions of the fingerprint being read by the Johnson device due to use of the prism.

Contrastingly, the inventive fingerprint reading device ensures that light travels uniformly through the flat light guiding plate so that the resolution of a read fingerprint device does not depend upon which portion of the fingerprint is being read.

Fujieda does not cure the foregoing defect. Fujieda was cited as disclosing the use of a flat light guiding plate 13 having parallel opposed main faces in a fingerprint reading device. However, as disclosed at col. 4, lines 39-43 of Fujieda, the optical plate 13 of Fujieda does not satisfy the limitations of amended independent claims 1, 6 and 11.

As noted above, claims 1, 6 and 11 recite a flat light guiding plate having parallel opposed main faces disposed over a front surface of the liquid crystal cell for:

(1) transmitting light projected from the rear surface of the liquid crystal cell; and

(2) deflecting toward a side end surface of the light guiding plate light entering from the front surface of the light guiding plate and directed toward the rear surface.

Fujieda discloses a fingerprint reading device comprised of a two-dimensional LCD matrix used as an image sensor 12, an optical element 13 for defining optical paths, and a planar light source 11 on which the sensor 12 and the optical element are provided. The upper face of the optical element 13 serves as a contact surface for a finger.

The optical element 13 of Fujieda does not perform the functions recited by amended independent claims 1, 6 and 11. Fujieda discloses that the optical element 13 defines the optical paths in a purely vertical direction and does not deflect toward a side end surface of the light guiding plate light entering from the front surface of the light guiding plate and directed toward the rear surface of the light guiding plate, as required by amended independent claims 1, 6 and 11. In fact, the optical element 13 of Fujieda is not capable of performing the claimed function due to the

transition portions between the respective waveguides making up the optical element 13.

The optical element 13 of Fujieda is constructed so that light may be focused on the finger contact area along the center lines between openings 28 and photo-sensitive elements 24 of the LCD matrix 12. In one embodiment of the optical element 13 shown in Fig. 7 of Fujieda, it can readily be seen that light emitted from the planar light source 11 passes vertically through a transparent substrate 21 and the optical element 13, and is applied obliquely onto a finger placed in contact with the optical element 13. Light reflected from an interface between the finger and the optical element 13 reaches the photo-sensitive element 24 by passing vertically through routes different from the optical paths of the incident light, as seen from Fig. 7. The light shielding plates 23 prevent the light from the planar light source 11 from being directly applied to the photosensitive element 24.

The use of vertically-oriented light paths such as fiber optic elements in the optical element 13 of Fujieda maintains vertical light paths which differ for light entering the device and light projected toward the fingertip. Thus, all light that passes through the optical element 13 of Fujieda must do so in only a vertical direction. The vertical arrangement of the light guides prevents deflection toward a

side end surface of deflecting light that enters a front surface of the device and directed toward a rear end surface as required by amended independent claims 1, 6 and 11.

The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. In re Fritch, 23 USPQ2d 1780, 1783 (Fed. Cir. 1992). For the reasons stated above, it is clear that Fujieda does not suggest modifying Johnson to provide a flat light guiding plate that deflects toward a side end surface of the light guiding plate light entering from the front surface thereof and directed toward a rear surface thereof. As described above, the optical element 13 of Fujieda is not capable of achieving this function. Thus, Fujieda provides no suggestion to modify the Johnson device to provide the claimed light guiding plate

Young does not cure the foregoing defects. Young discloses a touch sensitive input device comprised of a plurality of individually operable touch-sensitive elements having first and second overlapping and spaced conductive layers 12, 15 with the second conductive layer being displaceable towards the first conductive layer in response to a touch input. Young does not suggest modifying Johnson to provide a flat light guiding plate having parallel opposed main faces.

For the foregoing reasons, applicants respectfully submit that independent claims 1, 6 and 11 patentably distinguish over Johnson taken in combination with Fujieda and Young. For the same reasons, dependent claims 2-10, 12, 14-17 and 19-26 are allowable over the prior art of record. Thus, applicants respectfully submit that the claim rejections under 35 U.S.C. §103(a) should be withdrawn.

In view of the foregoing, the application is now believed to be in condition for allowance. Accordingly, entry of the present amendment together with favorable reconsideration and allowance of the claims are most respectfully requested.

Respectfully submitted,

ADAMS & WILKS
Attorneys for Applicants

By: _____
Bruce L. Adams
Reg. No. 25,386

50 Broadway - 31st Floor
New York, NY 10004
(212) 809-3700

**MAILING CERTIFICATE**

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: MS RCE, COMMISSIONER FOR PATENTS, P.O. Box 1450, Alexandria, VA 22313-1450, on the date indicated below.

Debra Buonincontri
Name

Debra Buonincontri
Signature

April 19, 2004
Date